

**STAT 750 HW#4**  
**Due Date: Thursday, 4/3/08**

**Note:** The numbered problems (e.g. 5.1, 5.4, etc.) refer to the problems in the textbook on pages 174-177.

1. 5.1
2. 5.4
3. Prove the “AR(2) variance result” given on page 162 of Example 5.2.1.
4. See the directions below for this problem.

**Note:** For problem 4 you are to carry out a complete analysis of the time series given in the ITSM file *appf.tsm*. The answers to these questions need to be obtained using ITSM. If a problem specifically asks for a plot you need to include it in your report. You also need to include any computer output that justifies your answers.

- a) Obtain a time series plot of the data and comment on the characteristics (e.g. trend, seasonality, etc.).
- b) Does the original series need to be transformed in any way? Why? I only want you to use Box-Cox transformations (if necessary) and differencing (if necessary) transformations. If transformations were used, express the transformed series in terms of the corresponding difference operator(s).
- c) Fit an ARMA( $p,q$ ) model to the series defined in part b. You need to discuss exactly how you arrived at your model (i.e.  $p$  and  $q$ ) and provide sufficient evidence (e.g. ACF/PACF functions, model selection criteria, etc.) to convince me that your model is a “good” candidate model.
- d) Perform a residual analysis for the model you chose in part c. If you think the model is adequate, based on the residual analysis, proceed with this model. Otherwise, return to part c and try another model. Once more, you need to provide sufficient evidence that suggests your model complies with underlying assumptions.
- e) Make a copy of the original data set (be sure to use a different name) and delete the last three observations in the data set. Import this modified series (which now contains 3 less values) into ITSM and enter the (estimated) model from part c into ITSM. Use this model to forecast the three deleted (playing the role of future) observations. These should be forecasts for the original (not transformed) series. Use 95% prediction intervals as well. Do these intervals capture the three observations you deleted? What do you think this says about the validity of your model in part c?